AMENDMENTS TO THE SPECIFICATION

Please add the following paragraph to page 1 after the Title of the Invention:

This is a Divisional Application of U.S. Application Serial No. 09/623,397, filed October 27, 2000, which is the National Stage of International Application No. PCT/JP99/01093, filed March 5, 1999.

Please amend the paragraph beginning on line 20 of page 3 as follows:

As described above, in the conventional image coding apparatus, the quantization step is ~~decided~~ adaptively decided to the human visual characteristics by using the rough feature data of the image signal for every predetermined period, and then the image signal is coded. Therefore, when coding is performed according to the extracted image feature data to reduce image degradation, the quantity of generated codes is increased as a whole. On the contrary, when the quantity of generated codes is reduced, image degradation occurs over the entire image displayed in the predetermined period.

Please amend the paragraph beginning on line 14 of page 4 as follows:

According to ~~Claim 1~~ one aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a quantization characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period; and coding the image signal. Therefore, the quantity of generated codes in each local region can be precisely controlled, and occurrence of coding noise can be controlled, by utilizing the statistical data of the whole image.

Please amend the paragraph beginning on line 24 of page 4 as follows:

According to ~~Claim 2~~ a second aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a filter

characteristic for each local region of the input image signal on the basis of image feature data of each local region; performing adaptive filtering; and coding the image signal. Since the noise component is locally suppressed or the frequency band is controlled by the adaptive filtering before coding, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 9 of page 5 as follows:

According to ~~Claim 3~~ a third aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a filter characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period; performing adaptive filtering; and coding the image signal. Since the noise component is locally suppressed or the frequency band is controlled before coding by the adaptive filtering utilizing the statistical data of the whole image, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 20 of page 5 as follows:

According to ~~Claim 4~~ a fourth aspect of the present invention, in the image coding method ~~described in Claim 1~~ of the first aspect, employed as an input image signal is a signal obtained by dividing an input image signal into local regions, deciding a filter characteristic for each local region of the input image signal on the basis of image feature data of each local region, and subjecting the image signal to adaptive filtering. Therefore, occurrence of coding noise and increase in the quantity of generated codes can be suppressed for each local region. Further, the quantity of generated codes can be precisely controlled for each local region, and occurrence of coding noise can be controlled.

Please amend the paragraph beginning on line 6 of page 6 as follows:

According to ~~Claim 5~~ a fifth aspect of the present invention, in the image coding method ~~described in Claim 1~~ of the first aspect, employed as an input image signal is a signal obtained by

dividing an input image signal into local regions, deciding a filter characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period, and subjecting the image signal to adaptive filtering. Therefore, occurrence of coding noise and increase in the quantity of generated codes can be suppressed for each local region by utilizing the statistical data of the whole image. Further, the quantity of generated codes can be precisely controlled for each local region, and occurrence of coding noise can be controlled.

Please amend the paragraph beginning on line 19 of page 6 as follows:

According to ~~Claim 6~~ a sixth aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into plural regions; deciding a filter characteristic and a quantization characteristic for each local region of the input image signal on the basis of image feature data of each local region; subjecting the image signal to adaptive filtering; and coding the image signal on the basis of the quantization characteristic. Since only the image feature data of the image signal before being filtered is used, highspeed and simple processing is realized.

Please amend the paragraph beginning on line 4 of page 7 as follows:

According to ~~Claim 7~~ a seventh aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a filter characteristic for each local region of the input image signal on the basis of image feature data of each local region; subjecting the image signal to adaptive filtering; deciding a quantization characteristic for each local region according to the decided filter characteristic; and coding the image signal on the basis of the quantization characteristic. Since the quantization characteristic is decided according to the filter characteristic of each local region, quantization compensation according to the image signal changed by the filtering can be performed, whereby occurrence of coding noise can be suppressed.

Please amend the paragraph beginning on line 17 of page 7 as follows:

According to ~~Claim B~~ an eighth aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a filter

characteristic and a quantization characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period; subjecting the image signal to adaptive filtering; and coding the image signal on the basis of the quantization characteristic. Since only the image feature data of the image signal before being filtered is used, high-speed and simple processing is realized.

Please amend the paragraph beginning on line 3 of page 8 as follows:

According to ~~Claim 9~~ a ninth aspect of the present invention, there is provided an image coding method comprising: dividing an input image signal into local regions; deciding a filter characteristic for each local region of the input image signal on the basis of the frequency distribution of image feature data of each local region over a predetermined period; subjecting the image signal to adaptive filtering; deciding a quantization characteristic for each local region according to the decided filter characteristic; and coding the image signal on the basis of the quantization characteristic. Since the quantization characteristic is decided according to the filter characteristic of each local region, quantization compensation according to the image signal changed by the filtering can be performed, whereby occurrence of coding noise can be suppressed.

Please amend the paragraph beginning on line 17 of page 8 as follows:

According to ~~Claim 10~~ a tenth aspect of the present invention, in the image coding method described in any of ~~Claims 1 to 9~~ the first through ninth aspects, each of the filter characteristic and the quantization characteristic decided for each local region is compensated by comparison between itself and that obtained by averaging filter characteristics or quantization characteristics of plural local regions adjacent to the target local region. Therefore, occurrence of visual incompatibility caused by that the quality of decoded image varies greatly between adjacent local regions, is avoided.

Please amend the paragraph beginning on line 1 of page 9 as follows:

According to ~~Claim 11~~ an eleventh aspect of the present invention, in the image coding method described in any of ~~Claims 1 to 10~~ the first through tenth aspects, the image feature data of

each local region is at least one of the following data: the average of absolute difference in luminance signals between adjacent pixels, the average of absolute difference in color-difference signals between adjacent pixels, the value of average luminance signal, the value of average color-difference signal, the variance of luminance signal, the variance of color-difference signal, the value representing the amount of motion, and representative vector data in color space. Therefore, degradation of quality of decoded image in a singular region which attracts human eyes, can be suppressed.

Please amend the paragraph beginning on line 13 of page 9 as follows:

According to ~~Claim 12~~ a twelfth aspect of the present invention, in the image coding method described in any of ~~Claims 2 to 11~~ the second through eleventh aspects, the filter characteristic is adaptively decided according to the image feature data of each local region and a control signal supplied from the outside. Therefore, the filter characteristic of the whole image can be controlled from the outside.

Please amend the paragraph beginning on line 19 of page 9 as follows:

According to ~~Claim 13~~ a thirteenth aspect of the present invention, in the image coding method described in ~~Claim 12~~ the twelfth aspect, the control signal supplied from the outside is at least one of the following values: the accumulated value of absolute value of frame or field pixel difference over an N (N: natural number) frame period of the input image signal, the accumulated value of quantity of coded data over an M (M: natural number) frame period, and the ratio of quantity of coded data in each frame. Therefore, the original data quantity can be effectively reduced by the feature of the motion of the input image signal, whereby the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 5 of page 10 as follows:

According to ~~Claim 14~~ a fourteenth aspect of the present invention, in the image coding method described in any of ~~Claims 1, 3, 5, 8 to 13~~ the first, third, fifth and eighth through thirteenth

aspects, amongst the data used for decision of the quantization characteristic or the filter characteristic, the data of the frequency distribution of the image feature data is calculated a predetermined period before, for the image signal to be coded for each local region, in the same scene, and this operation is nullified when there is a change in the scene. Since the data of the frequency distribution of each image feature data calculated a predetermined period before is used, the quantization characteristic and filter characteristic for each block can be decided before verifying the frequency distribution of each image feature data, whereby the processing speed is increased.

Please amend the paragraph beginning on line 18 of page 10 as follows:

According to ~~Claim 15~~ a fifteenth aspect of the present invention, there is provided an image coding and decoding method for coding the image feature data of each local region as well, in the image coding method described in any of ~~Claims 1 to 14~~ the first through fourteenth aspects, and this method further comprises: recording a coded data sequence; and, at the time of reproduction, decoding the coded data sequence, and subjecting each local region of the decoded image signal to adaptive filtering on the basis of the image feature data of the decoded local region. Therefore, the decoded image signal can be subjected to adaptive filtering without extracting the image feature data of each local region at reproduction, whereby coding noise is effectively suppressed, and the signal is enhanced.

Please amend the paragraph beginning on line 5 of page 11 as follows:

According to ~~Claim 16~~ a sixteenth aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period; quantization step decision means for deciding a quantization characteristic according to the data extracted by the first characteristic extraction means and the second characteristic extraction means; and coding

means for coding the input image signal divided by the local region division means, on the basis of the quantization step decided by the quantization step decision means. Therefore, the quantity of generated codes in each local region can be precisely controlled, and occurrence of coding noise can be controlled, by utilizing the statistical data of the whole image.

Please amend the paragraph beginning on line 24 of page 11 as follows:

According to ~~Claim 17~~ a seventeenth aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means. Since the noise component is locally suppressed or the frequency band is controlled by the adaptive filtering before coding, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 16 of page 12 as follows:

According to ~~Claim 18~~ an eighteenth aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by

the filter characteristic decision means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means. Since the noise component is locally suppressed or the frequency band is controlled before coding by the adaptive filtering utilizing the statistical data of the whole image, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 12 of page 13 as follows:

According to ~~Claim 19~~ a nineteenth aspect of the present invention, the image coding apparatus described in ~~Claim 16~~ the sixteenth aspect further comprises: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means; and filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; wherein a signal which has been filtered by the filter means is used as an input image signal. Therefore, occurrence of coding noise and increase in the quantity of generated codes can be suppressed for each local region. Further, the quantity of generated codes can be precisely controlled for each local region, and occurrence of coding noise can be controlled.

Please amend the paragraph beginning on line 4 of page 14 as follows:

According to ~~Claim 20~~ a twentieth aspect of the present invention, the image coding apparatus described in ~~Claim 16~~ the sixteenth aspect further comprises: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction

means; and filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; wherein a signal which has been filtered by the filtering means is used as an input image signal. Therefore, occurrence of coding noise and increase in the quantity of generated codes can be suppressed for each local region. Further, the quantity of generated codes can be precisely controlled for each local region, and occurrence of coding noise can be controlled.

Please amend the paragraph beginning on line 25 of page 14 as follows:

According to ~~Claim 21~~ a twenty-first aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; quantization step decision means for deciding a quantization characteristic according to the data extracted by the first feature extraction means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means. Since only the image feature data of the image signal before being filtered is used, high-speed and simple processing is realized.

Please amend the paragraph beginning on line 20 of page 15 as follows:

According to ~~Claim 22~~ a twenty-second aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input image signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis

of the filter characteristic decided by the filter characteristic decision means; quantization step decision means for deciding a quantization characteristic according to the data decided by the filter characteristic decision means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means. Since the quantization characteristic is decided according to the filter characteristic of each local region, quantization compensation according to the image signal changed by the filtering can be performed, whereby occurrence of coding noise can be suppressed.

Please amend the paragraph beginning on line 17 of page 16 as follows:

According to ~~Claim 23~~ a twenty-third aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; quantization step decision means for deciding a quantization characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means. Since only the image feature data of the image signal before being filtered is used, high-speed and simple processing is realized.

Please amend the paragraph beginning on line 15 of page 17 as follows:

According to ~~Claim 24~~ a twenty-fourth aspect of the present invention, there is provided an image coding apparatus comprising: local region division means for dividing an input signal into local regions each comprising plural pixels; first feature extraction means for extracting image feature data for each local region obtained by the local region division means; second feature extraction means for extracting the representative value and the variance of the image feature data from the frequency distribution of the image feature data over a predetermined period; filter characteristic decision means for deciding a filter characteristic according to the data extracted by the first feature extraction means and the second feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; quantization step decision means for deciding a quantization characteristic according to the data decided by filter characteristic decision means; and coding means for coding the image signal which has been adaptively filtered for each local region by the filtering means, on the basis of the quantization step decided by the quantization step decision means. Since the quantization characteristic is decided according to the filter characteristic of each local region, quantization compensation according to the image signal changed by the filtering can be performed, whereby occurrence of coding noise can be suppressed.

Please amend the paragraph beginning on line 15 of page 18 as follows:

According to ~~Claim 25~~ a twenty-fifth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 16 to 24~~ the sixteenth through twenty-fourth aspects, each of the filter characteristic and the quantization characteristic which are decided for each local region by the filter characteristic decision means and the quantization step decision means, respectively, is compensated by comparison between itself and that obtained by averaging the filter characteristics or the quantization characteristics of plural local regions adjacent to the target local region. Therefore, occurrence of visual incompatibility caused by that the quality of decoded image varies greatly between adjacent local regions, is avoided.

Please amend the paragraph beginning on line 1 of page 19 as follows:

According to ~~Claim 26~~ a twenty-sixth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 16 to 25~~ the sixteenth through twenty-fifth aspects, the data extracted by the first feature extraction means is at least one of the following data: the average of absolute difference in luminance signals between adjacent pixels, the average of absolute difference in color-difference signals between adjacent pixels, the average luminance value, the average color-difference value, the variance of luminance signal, the variance of color-difference signal, the value representing the amount of motion, and the representative vector data in color space. Therefore, degradation of quality of decoded image in a singular region which attracts human eyes, can be suppressed.

Please amend the paragraph beginning on line 13 of page 19 as follows:

According to ~~Claim 27~~ a twenty-seventh aspect of the present invention, in the image coding apparatus described in any of ~~Claims 17 to 26~~ the seventeenth through twenty-sixth aspects, the filter characteristic decision means adaptively decides the filter characteristic according to a control signal supplied from the outside as well as the data extracted from the first feature extraction means and the second feature extraction means. Therefore, the filter characteristic of the whole image can be controlled from the outside.

Please amend the paragraph beginning on line 21 of page 19 as follows:

According to ~~Claim 28~~ a twenty-eighth aspect of the present invention, in the image coding apparatus described in ~~Claim 27~~ the twenty-seventh aspect, the control signal supplied from the outside is at least one of the following values: the accumulated value of absolute value of frame or field pixel difference over an N (N: natural number) frame period of the input image signal, the accumulated value of quantity of coded data over an M (M: natural number) frame period, and the ratio of quantity of coded data in each frame. Therefore, the original data quantity can be effectively reduced by the feature of the motion of the input image signal, whereby the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 7 of page 20 as follows:

According to ~~Claim 29~~ a twenty-ninth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 16, 18 to 20, and 23 to 28~~ the sixteenth, eighteenth through twentieth and twenty-third through twenty-eighth aspects, the data of the second feature extraction means to be input to the quantization step decision means or to the filter characteristic decision means is a predetermined period delayed from the data of the first feature extraction means in the same scene, and this operation is nullified when there is a change in the scene. Since the data of the frequency distribution of each image feature data calculated a predetermined period before is used, the quantization characteristic and filter characteristic for each block can be decided before verifying the frequency distribution of each image feature data, whereby the processing speed is increased, and the memory is reduced.

Please amend the paragraph beginning on line 20 of page 20 as follows:

According to ~~Claim 30~~ a thirtieth aspect of the present invention, there is provided an image recording and reproduction apparatus for quantizing and coding the input image signal divided into the local regions, and coding at least one of the data extracted by the first and second feature extraction means, in the coding means included in the image coding apparatus described in any of ~~Claims 16 to 29~~ the sixteenth through twenty-ninth aspects, and this apparatus further comprises: recording means for recording a coded data sequence obtained by the coding means; reproduction means for reproducing the coded data sequence recorded by the recording means; decoding means for decoding the data extracted by the first or second feature extraction means and the quantized and coded image signal after separating them from the coded data sequence reproduced by the reproduction means, thereby obtaining the decoded feature data and the decoded image signal; and filtering means for subjecting each local region of the decoded image signal to adaptive filtering on the basis of the decoded feature data. Therefore, the decoded image signal can be subjected to adaptive filtering without extracting the image feature data of each local region at reproduction, whereby coding noise is effectively suppressed, and the signal is enhanced.

Please amend the paragraph beginning on line 16 of page 21 as follows:

According to ~~Claim 31~~ a thirty-first aspect of the present invention, there is provided an image coding method comprising: deciding a local quantization characteristic of an input image signal on the basis of image feature data of the input image signal for a predetermined period and the local image feature data of the input image signal; and coding the image signal. Therefore, precise control of coding rate is performed.

Please amend the paragraph beginning on line 23 of page 21 as follows:

According to ~~Claim 32~~ a thirty-second aspect of the present invention, there is provided an image coding method comprising: deciding a local filter characteristic of an input image signal on the basis of image feature data of the input image signal for a predetermined period and the local image feature data of the input image signal; subjecting the image signal to adaptive filtering; and coding the image signal. Since the noise component is locally suppressed or the frequency band is controlled by the adaptive filtering before coding, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 8 of page 22 as follows:

According to ~~Claim 33~~ a thirty-third aspect of the present invention, in the image coding method described in any of ~~Claims 31 and 32~~ the thirty-first and thirty-second aspects, the image feature data is at least one of the following data: the average luminance level, the representative vector data in the color space, and the luminance variance. Therefore, a region where coding noise is conspicuous can be locally reduced utilizing the human visual characteristics to each data, while minimizing the influence on the coding rate.

Please amend the paragraph beginning on line 16 of page 22 as follows:

According to ~~Claim 34~~ a thirty-fourth aspect of the present invention, in the image coding method described in ~~Claim 33~~ the thirty-third aspect, the representative vector data in the color space

is the data of average of each of the two color-difference signals possessed by pixels. Therefore, coding noise in a region of the whole image which attracts human eyes can be locally reduced.

Please amend the paragraph beginning on line 22 of page 22 as follows:

According to ~~Claim 35~~ a thirty-fifth aspect of the present invention, in the image coding method described in any of ~~Claims 31, 33 and 34~~ the thirty-first, thirty-third and thirty-fourth aspects, the local quantization characteristic of the input image signal is decided on the basis of a difference between the image feature data of the input image signal for the predetermined period and the local image feature data of the input image signal, and then the image signal is coded. Therefore, a region where coding noise is conspicuous can be locally reduced utilizing the human visual characteristics to each data, while minimizing the influence on the coding rate.

Please amend the paragraph beginning on line 7 of page 23 as follows:

According to ~~Claim 36~~ a thirty-sixth aspect of the present invention, in the image coding method described in any of ~~Claims 2, 33 and 34~~ the second, thirty-third and thirty-fourth aspects, the local filter characteristic of the input image signal is decided on the basis of the image feature data of the input image signal for predetermined period and the local image feature data of the input image signal, and the image signal is subjected to adaptive filtering, followed by coding. Therefore, the noise component included in a region where coding noise is conspicuous is locally suppressed before coding or the frequency bands of the region where coding noise is conspicuous and the other region are controlled, whereby increase in the coding rate and occurrence of coding noise are suppressed.

Please amend the paragraph beginning on line 19 of page 23 as follows:

According to ~~Claim 37~~ a thirty-seventh aspect of the present invention, in the image coding method described in any of ~~Claims 33 and 34~~ the thirty-third and thirty-fourth aspects, the local filter characteristic of the input image signal is decided on the basis of a difference between the image feature data of the input image signal for the predetermined period and the local image feature data

of the input image signal and on the luminance variance for the predetermined period, and the image signal is subjected to adaptive filtering, followed by coding. Therefore, the frequency band of a singular region of the input image which attracts human eyes is maintained as it is while the frequency band of the other region is limited, whereby generation of coding rate is suppressed.

Please amend the paragraph beginning on line 6 of page 24 as follows:

According to ~~Claim 38~~ a thirty-eighth aspect of the present invention, in the image coding method described in ~~Claim 33~~ the thirty-third aspect, the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 13 of page 24 as follows:

According to ~~Claim 39~~ a thirty-ninth aspect of the present invention, in the image coding method described in ~~Claim 33~~ the thirty-third aspect, the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 22 of page 24 as follows:

According to ~~Claim 40~~ a fortieth aspect of the present invention, in the image coding method described in any of ~~Claims 38 and 39~~ the thirty-eighth and thirty-ninth aspects, the predetermined range in the color space is a region representing the skin color. Therefore, coding noise in the skin color region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 3 of page 25 as follows:

According to ~~Claim 41~~ a forty-first aspect of the present invention, there is provided an image coding apparatus comprising: blocking means for dividing an input image signal into blocks each comprising plural pixels; first feature extraction means for extracting a local feature for each divided block obtained by the blocking means; second feature extraction means for extracting a feature from the input image signal for every predetermined period; quantization step decision means for deciding a quantization characteristic according to the respective data extracted by the first feature extraction means and the second feature extraction means; and coding means for coding the input image signal blocked by the blocking means, on the basis of the quantization step decided by the quantization step decision means. Therefore, precise control of coding rate can be performed.

Please amend the paragraph beginning on line 17 of page 25 as follows:

According to ~~Claim 42~~ a forty-second aspect of the present invention, there is provided an image coding apparatus comprising: blocking means for dividing an input image signal into blocks each comprising plural pixels; first feature extraction means for extracting a local feature for each divided block obtained by the blocking means; second feature extraction means for extracting a feature from the input image signal for every predetermined period; filter characteristic decision means for deciding a filter characteristic according to the respective data extracted by the first feature extraction means and the second feature extraction means; filtering means for subjecting the image signal to adaptive filtering on the basis of the filter characteristic decided by the filter characteristic decision means; and coding means for coding the image signal which has been adaptively filtered for each block by the filtering means. Since the noise component is locally suppressed or the frequency band is controlled by the adaptive filtering before coding, occurrence of coding noise and increase in the quantity of generated codes can be suppressed.

Please amend the paragraph beginning on line 11 of page 26 as follows:

According to ~~Claim 43~~ a forty-third aspect of the present invention, in the image coding apparatus described in any of ~~Claims 41 and 42~~ the forty-first and forty-second aspects, the data

extracted by the first feature extraction means and the second feature extraction means are at least one of the following data: the average luminance level, the representative vector data in the color space, and the luminance variance. Therefore, a region where coding noise is conspicuous can be locally reduced utilizing the human visual characteristics to each data, while minimizing the influence on the coding rate.

Please amend the paragraph beginning on line 20 of page 26 as follows:

According to ~~Claim 44~~ a forty-fourth aspect of the present invention, in the image coding apparatus described in ~~Claim 43~~ the forty-third aspect, the representative vector data in the color space is the data of average of each of the two color-difference signals possessed by pixels. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 1 of page 27 as follows:

According to ~~Claim 45~~ a forty-fifth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 41, 43 and 44~~ the forty-first, forty-third and forty-fourth aspects, the quantization step decision means decides the quantization step according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means. Therefore, a region where coding noise is conspicuous can be locally reduced utilizing the human visual characteristics to each data, while minimizing the influence on the coding rate.

Please amend the paragraph beginning on line 10 of page 27 as follows:

According to ~~Claim 46~~ a forty-sixth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 42, 43 and 44~~ the forty-second, forty-third and forty-fourth aspects, the filter characteristic decision means decides the filter characteristic according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means. Therefore, the noise component included in a region where

coding noise is conspicuous is locally suppressed before coding or the frequency bands of the region where coding noise is conspicuous and the other region are controlled, whereby increase in the coding rate and occurrence of coding noise are suppressed.

Please amend the paragraph beginning on line 21 of page 27 as follows:

According to ~~Claim 47~~ a forty-seventh aspect of the present invention, in the image coding apparatus described in any of ~~Claims 43 and 44~~ the forty-third and forty-fourth aspects, the filter characteristic decision means decides the filter characteristic according to a difference between the data extracted by the first feature extraction means and the data extracted by the second feature extraction means, and the luminance variance for every predetermined period. Therefore, the frequency band of a singular region of the input image signal which attracts human eyes is maintained as it is while the frequency band of the other region is limited, whereby generation of coding rate is suppressed.

Please amend the paragraph beginning on line 6 of page 28 as follows:

According to ~~Claim 48~~ a forty-eighth aspect of the present invention, in the image coding apparatus described in ~~Claim 43~~ the forty-third aspect, the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 14 of page 28 as follows:

According to ~~Claim 49~~ a forty-ninth aspect of the present invention, in the image coding apparatus described in ~~Claim 43~~ the forty-third aspect, the representative vector data on the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined

period. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 23 of page 28 as follows:

According to ~~Claim 50~~ a fiftieth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 48 and 49~~ the forty-eighth and forty-ninth aspects, the predetermined range in the color space is a region representing the skin color. Therefore, coding noise in the skin color region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 4 of page 29 as follows:

According to ~~Claim 51~~ a fifty-first aspect of the present invention, in the image coding method described in ~~Claim 11~~ the eleventh aspect, the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 11 of page 29 as follows:

According to ~~Claim 52~~ a fifty-second aspect of the present invention, in the image coding method described in ~~Claim 11~~ the eleventh aspect, the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 20 of page 29 as follows:

According to ~~Claim 53~~ a fifty-third aspect of the present invention, in the image coding method described in any of ~~Claims 51 and 52~~ the fifty-first and fifty-second aspects, the

predetermined range in the color space is a region representing the skin color. Therefore, coding noise in the skin color region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 1 of page 30 as follows:

According to ~~Claim 54~~ a fifty-fourth aspect of the present invention, in the image coding apparatus described in ~~Claim 26~~ the twenty-sixth aspect, the representative vector data in the color space is the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 8 of page 30 as follows:

According to ~~Claim 55~~ a fifty-fifth aspect of the present invention, in the image coding apparatus described in ~~Claim 26~~ the twenty-sixth aspect, the representative vector data in the color space is decided according to the data of average of each of the two color-difference signals possessed by pixels, and the data of frequency at which color space vectors represented by the luminance signal and two color-difference signals possessed by pixels are within a predetermined range. Therefore, coding noise in a region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 17 of page 30 as follows:

According to ~~Claim 56~~ a fifty-sixth aspect of the present invention, in the image coding apparatus described in any of ~~Claims 54 and 55~~ the fifty-fourth and fifty-fifth aspects, the predetermined range in the color space is a region representing the skin color. Therefore, coding noise in the skin color region of the whole image, which attracts human eyes, can be locally suppressed.

Please amend the paragraph beginning on line 1 of page 34 as follows:

Hereinafter, a first embodiment of the present invention which corresponds to ~~Claim 1 and Claim 16~~ the first aspect and the sixteenth aspect will be described with reference to figures 1 to 3.

Please amend the paragraph beginning on line 18 of page 39 as follows:

Hereinafter, a second embodiment of the present invention corresponding to ~~Claim 2, Claim 3, Claim 17, and Claim 18~~ the second, third, seventeenth and eighteenth embodiments will be described with reference to figures 2 to 4.

Please amend the paragraph beginning on line 24 of page 39 as follows:

As shown in figure 4, the image coding apparatus of this second embodiment comprises a blocking circuit 401 for dividing an input image signal into a plurality of two-dimensional blocks each comprising a plurality of pixels; a block average luminance level extractor 402 for extracting the average luminance level of each blocked region; a block adjacent pixel luminance level difference average extractor 403 for extracting the average of absolute difference in luminance levels between adjacent pixels in each blocked region; a block adjacent pixel color-difference level difference average extractor 404 for extracting the average of absolute difference in color-difference levels between adjacent pixels in each blocked region; a block luminance variance extractor 405 for extracting the luminance level variance of each blocked region; a block color-difference variance extractor 406 for extracting the color-difference variance of each blocked region; a block motion vector extractor 407 for extracting a value representing the motion vector of each blocked region (like the first embodiment, an extractor for extracting the representative vector data in the color space may be provided); frequency distribution ~~detectors~~ verifiers 408 each for calculating the average and variance of each feature data from the frequency distribution over a predetermined period, of the feature data in each block; a filter characteristic decider 409; a filter circuit 410; and an encoder 411.

Please amend the paragraph beginning on line 6 of page 41 as follows:

In figure 4, the six kinds of image feature data extracted block by block, and the averages μ and variances σ outputted from the respective frequency distribution ~~detectors~~ verifiers 408 are input to the filter characteristic decider 409.

Please amend the paragraph beginning on line 16 of page 43 as follows:

Hereinafter, a third embodiment of the present invention corresponding to ~~Claims 4 to 6 and Claims 19 to 21~~ the fourth through sixth and nineteenth through twenty-first aspects will be described with reference to figure 5.

Please amend the paragraph beginning on line 22 of page 43 as follows:

As shown in figure 5, the image coding apparatus of this third embodiment comprises a blocking circuit 501 for dividing an input image signal into a plurality of two-dimensional blocks each comprising a plurality of pixels; a block average luminance level extractor 502 for extracting the average luminance level of each blocked region; a block adjacent pixel luminance level difference average extractor 503 for extracting the average of absolute difference in luminance levels between adjacent pixels in each blocked region; a block adjacent pixel color-difference level difference average extractor 504 for extracting the average of absolute difference in color-difference levels between adjacent pixels in each blocked region; a block luminance variance extractor 505 for extracting the luminance level variance of each blocked region; a block color-difference variance extractor 506 for extracting the color-difference variance of each blocked region; a block motion vector extractor 507 for extracting a value representing the motion vector of each blocked region; frequency distribution ~~detectors~~ verifiers 508 each for calculating the average and variance of each feature data from the frequency distribution over a predetermined period, of each feature data in each block; a filter characteristic decider 509; a quantization step decider 510; a filter circuit 511; and an encoder 512.

Please amend the paragraph beginning on line 5 of page 46 as follows:

Hereinafter, a fourth embodiment of the present invention corresponding to ~~Claim 4, Claim 5, Claim 7, Claim 19, Claim 20, and Claim 22~~ the fourth, fifth, seventh, nineteenth, twentieth and twenty-second aspects will be described with reference to figure 6.

Please amend the paragraph beginning on line 11 of page 46 as follows:

As shown in figure 6, the image coding apparatus of this fourth embodiment comprises a blocking circuit 601 for dividing an input image signal into a plurality of two-dimensional blocks each comprising a plurality of pixels; a block average luminance level extractor 602 for extracting the average luminance level of each blocked region; a block adjacent pixel luminance level difference average extractor 603 for extracting the average of the absolute difference in luminance levels between adjacent pixels in each blocked region; a block adjacent pixel color-difference level difference average extractor 604 for extracting the average of absolute difference in color-difference levels between adjacent pixels in each blocked region; a block luminance variance extractor 605 for extracting the luminance level variance of each blocked region; a block color-difference variance extractor 606 for extracting the color-difference variance of each blocked region; a block motion vector extractor 607 for extracting a value representing the motion vector of each blocked region; frequency distribution ~~detectors~~ verifiers 608 each for calculating the average and variance from the frequency distribution over a predetermined period, of each characteristic data for each block; a filter characteristic decider 609; a quantization step decider 610; a filter circuit 611; and an encoder 612.

Please amend the paragraph beginning on line 19 of page 47 as follows:

In figure 6, the filter characteristic decided for each block by the filter characteristic decider 609 is input to the filter circuit 611 and, on the other ~~than~~ hand, it is also input to the quantization step decider 610. The quantization step decider 610 compensates the quantization step for each block on the basis of the filter characteristic decided for each block, and outputs the quantization data to the encoder 612.

Please amend the paragraph beginning on line 8 of page 49 as follows:

Hereinafter, a fifth embodiment of the present invention corresponding to ~~Claim 8 and Claim 23~~ the eighth and twenty-third aspects will be described with reference to figure 7.

Please amend the paragraph beginning on line 14 of page 49 as follows:

As shown in figure 7, the image coding apparatus of this fifth embodiment comprises a blocking circuit 701 for dividing an input image signal into a plurality of two-dimensional blocks each comprising a plurality of pixels; a block average luminance level extractor 702 for extracting the average luminance level of each blocked region; a block adjacent pixel luminance level difference average extractor 703 for extracting the average of absolute difference in luminance levels between adjacent pixels in each blocked region; a block adjacent pixel color-difference level difference average extractor 704 for extracting the average of absolute difference in color-difference levels between adjacent pixels in each blocked region; a block luminance variance extractor 705 for extracting the luminance level variance of each blocked region; a block color-difference variance extractor 706 for extracting the color-difference variance of each blocked region; a block motion vector extractor 707 for extracting a value representing the motion vector of each blocked region; frequency distribution ~~detectors~~ verifiers 708 each for calculating the average and variance from the frequency distribution over a predetermined period, of each characteristic data of each block; a filter characteristic decider 709; a quantization step decider 710; a filter characteristic compensator 711, a quantization step compensator 712, a filter circuit 713, and an encoder 714.

Please amend the paragraph beginning on line 12 of page 52 as follows:

Hereinafter, a sixth embodiment of the present invention corresponding to ~~Claim 9 and Claim 24~~ the ninth and twenty-fourth aspects will be described with reference to figure 8.

Please amend the paragraph beginning on line 18 of page 52 as follows:

As shown in figure 8, the image coding apparatus of this eighth embodiment comprises a blocking circuit 801 for dividing an input image signal into a plurality of two-dimensional blocks

each comprising a plurality of pixels; a block average luminance level extractor 802 for extracting the average luminance level of each blocked region; a block adjacent pixel luminance level difference average extractor 803 for extracting the average of the absolute difference in luminance levels between adjacent pixels in each blocked region; a block adjacent pixel color-difference level difference average extractor 804 for extracting the average of absolute difference in color-difference levels between adjacent pixels in each blocked region; a block luminance variance extractor 805 for extracting the luminance level variance of each blocked region; a block color-difference variance extractor 806 for extracting the color-difference variance of each blocked region; a block motion vector extractor 807 for extracting a value representing the motion vector of each blocked region; frequency distribution ~~detectors~~ verifiers 808 each for calculating the average and variance from the frequency distribution over a predetermined period, of each characteristic data for each block; a filter characteristic decider 809; a filter circuit 810, an encoder 811, a frame pixel difference accumulator 812, and a filter intensity control signal generator 813.

Please amend the paragraph beginning on line 13 of page 56 as follows:

As described above, according to the sixth embodiment, in the image coding method according to any of second to fifth embodiments, the filter characteristic is adaptively decided ~~adaptively~~ to the image feature data of each local region and the control signal supplied from the outside, whereby the filter characteristic of the whole image can be externally controlled ~~from the outside~~.

Please amend the paragraph beginning on line 21 of page 56 as follows:

Hereinafter, a seventh embodiment of the present invention corresponding to ~~Claim 15 and Claim 30~~ the fifteenth and thirtieth aspects will be described with reference to figure 9.

Please amend the paragraph beginning on line 2 of page 57 as follows:

As shown in figure 9, the image recording/reproduction apparatus of this seventh embodiment comprises a blocking circuit 901 for dividing an input image signal into a plurality of

two dimensional blocks each comprising a plurality of pixels; a block average luminance level extractor 902 for extracting the average luminance level of each blocked region; a frequency distribution verifier 903 for calculating the average and variance from the frequency distribution over a predetermined period, of the average luminance level of each block extracted; a filter characteristic decider 904 for deciding the filter characteristic for each block; a quantization step decider 905; a filter circuit 906 adaptively operating ~~adaptively~~ to each block; an encoder 907; a recording signal processor 908; a recording medium 909; a reproduction signal processor 910; a decoder 911 for decoding coded data sequences; a frequency distribution verifier 912 for obtaining the frequency distribution for a predetermined period from the average luminance level of each decoded block, and verifying this; a filter circuit 913 adaptively operating ~~adaptively~~ to each block of the decoded image signal; and a filter characteristic decider 914 for deciding the filter characteristic of each block. To simplify the description, only the average luminance level is taken as an example of image feature data.

Please amend the paragraph beginning on line 1 of page 60 as follows:

As described above, according to the seventh embodiment, in the coding method according to any of ~~Claims 1 to 6~~ the first through sixth aspects, the image feature data of each local region is encoded as well, and the coded data sequence is recorded. At reproduction, the coded data sequence is decoded, and adaptive filtering is performed for each local region of the decoded image signal on the basis of the decoded image feature data of each local region. Therefore, adaptive filtering can be performed on the decoded image signal without extracting the image feature data of each local region at reproduction, whereby coding noise is effectively reduced, and signal enhancement is achieved.